The rejection of Claims 22-42 under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent No. 5,633,174 (Li) in view of *Oxygen Precipitation Control by Hydrogen and Preannealing at 425 °C in Czochralski Silicon Crystals* (Hara et al), is respectfully traversed.

As recited in Claim 22, the present invention is a method for producing a layer of a first material embedded in a substrate comprising at least one second material, comprising the following stages: formation in said substrate, at the level of the desired embedded layer, and by a method excluding the formation of a porous layer, of a layer of microcavities intended to serve as centers of nucleation and volume accommodation to produce said first material in said second material, formation of precipitate embryos from the nucleation centers formed, the precipitate embryos corresponding to the first material, growth of the precipitates from the embryos through species concentration corresponding to the first material and carried to the microcavity layer.

It is noted that the present invention is characterized by the production of a layer of a **first material** embedded in a substrate comprising at least one **second material**.

As described in the specification beginning at page 1, line 6, at present, substrates of the Silicon on Insulator or SOI type are of great interest for microelectronic applications in the domain of low consumption, and there are several methods for obtaining such substrates. The present invention is considered to be an improvement of such prior art methods.

Li is directed to a method of making a silicon wafer having an improved single-crystal silicon layer with improved electronic properties on a defect layer produced by hydrogen ion implantation and two subsequent annealing steps--the silicon wafer is subjected to a first annealing step to form an interior layer of hydrogen bubbles beneath the surface layer and during another annealing step, the bubble-related defects getter the impurities in the surface layer (column 2, lines 13-21). Li discloses that his process overcomes the

disadvantages of prior art materials such as GaAs, CZ silicon, and SOI material (column 2, lines 28-30). Indeed, in the Background of the Invention section, Li describes the disadvantages of these materials and thus, teaches away from materials such as SOI. It is clear that in Li, the surface layer and the buried layer are both made of silicon but with different electrical properties. Thus, Li does not disclose a process wherein a first material is embedded in a substrate comprising at least one second material, as these terms would be understood herein. In the present invention, the precipitate embryos can be formed from species present in the second material or from species introduced. The last step of the method comprises the introduction of species corresponding to the precipitate embryos in order to make the embryos grow to obtain the first material. Thus, whereas the hydrogen bubbles of Li are used to getter the impurities present in the surface layer, the microcavities of the present invention are used to create a layer of a different material.

Hara et al does not remedy the above-discussed deficiencies of Li. Hara et al discloses a method for controlling the amount and depth distribution of oxygen precipitates in a silicon substrate. The method comprises doping the substrate by hydrogen introduced in the substrate during an annealing operation. The presence of hydrogen facilitates the diffusion of oxygen. The substrate obtained by this method comprises a single material containing a distribution of oxygen precipitates.

Without the present disclosure as a guide, it is not clear why one skilled in the art would combine Li and Hara et al since, as discussed above, Li is not concerned with a first material and a second material.

During the above-referenced interview, the Examiner indicated that he finds that the step in the present claims of forming a layer of microcavities reads on, or is inclusive of, the step of forming hydrogen bubbles between the surface layer in Li. The Examiner also

indicated that such hydrogen bubble formation would have been an obvious first step prior to practicing the process of Hara et al, i.e., precipitating oxygen in the hydrogen bubbles, thus forming, presumably silicon oxide in silicon. In the Office Action, the Examiner finds that Li "does teach implantation first material of hydrogen into a second material of silicon."

In reply, the hydrogen implanted during the process of Li does not constitute a first material as that term would be understood in the context of the present invention.

Applicants submit that it would be useful to further describe the presently-claimed method. It comprises a first step of formation of a layer of microcavities. The layer of microcavities can be formed by implantation of hydrogen, a rare gas such as helium, or fluorine, as described in the specification from page 1, line 24 to page 2, line 2; page 3, lines 3-6; page 7, lines 19-22; page 12, lines 11-16. It is convenient to obtain the layer of microcavities by ionic implantation. However, other methods are possible, as described in the specification, from page 7, line 24 to page 8, line 6. If the microcavities are obtained by hydrogen implantation, the hydrogen is not used in the rest of the method. Consequently, the hydrogen can be eliminated from the substrate.

According to the applied prior art, hydrogen is necessary for the implementation of the methods. As discussed above, according to Li, hydrogen implantation provokes the formation of a layer of hydrogen bubbles which causes structural defects around the bubbles. The bubbles, during an annealing step, act as a getter for the impurities present in the superficial layer (see col. 2, line 17-21). According to Hara et al, hydrogen facilitates oxygen diffusion to obtain a distribution of oxygen precipitates in the silicon substrate.

As stated above, concerning the present invention, the presence of hydrogen is not necessary. Furthermore, the microcavities have a function of volume accommodation (as recited in Claim 22), allowing a layer of the first material to grow by combination of an

element (or species) brought to the microcavity layer and an element of the second material. Thus, oxygen introduced (species brought) can combine with silicon (second material of the substrate) to give a layer of silicon oxide.

For all the above reasons, it is respectfully requested that the rejection over Li in view of Hara et al be withdrawn.

All of the presently-pending claims are believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue.

Respectfully submitted,

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